

REMARKS

This Amendment is filed in response to the Office Action dated February 24, 2005, which has a shortened statutory period set to expire May 24, 2005.

Claim Objections

Claim 1, line 8 stands objected to for the use of the phrase "in turn". Claim 1 is amended to remove the phrase "in turn", thereby rendering the objection moot. Accordingly, Applicants respectfully request reconsideration and withdrawal of the objection to Claim 1.

Rejections Under 35 U.S.C. 102

Claims 1-4 and 6-9 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,999,714, issued December 7, 1999 to Conn et al. (hereinafter "Conn"). Claims 7 and 8 are cancelled, rendering the rejection of those claims moot. Applicants respectfully traverse the rejections of Claim 1-4, 6, and 9.

Claim 1, as amended, recites:

A method of interactively optimizing an engineering design, the method comprising:

- assigning a baseline set of design values to a set of design variables for the engineering design;
- conducting a sensitivity analysis on the engineering design to determine a set of performance factors, wherein each of the set of performance factors defines an effect on a set of metrics for the engineering design of variations in a selected one of the set of design variables over a range of values while holding the set of design variables except for the selected one at the baseline set of design values;
- and

- manually changing one or more of the baseline set of design values based on the set of performance factors to generate an updated set of design values for the set of design variables.

Support for this amendment is found in the specification as originally filed at least at paragraphs 28 and 43 and in FIG. 1. No new matter is added. Claims 2-4 and 6 depend from Claim 1 and are amended as necessary to maintain consistency with amended Claim 1.

"[C]onducting a sensitivity analysis" as recited in Claim 1 beneficially:

allows the designer to gain insight into the problem domain by enabling the designer to visualize the metric dependencies on any design variable ... [and] allows the designer to visualize the tradeoffs of multiple metrics through a design variable and allows the identification of the design variables which are important in the modification of a specified metric." (Specification as originally filed, paragraph 23.)

Likewise, "manually changing one or more of the baseline set of design values based on the set of performance factors" as further recited in Claim 1, allows a designer to make modifications based on "the designer's understanding of the topology's functioning ... [whereas, in] automated sizing that critical link between topology and design variables is weakened because the designer is less involved with specific design variables." (Specification as originally filed, paragraph 33.)

Applicants respectfully submit that Conn does not teach:

[C]onducting a sensitivity analysis on the engineering design to determine a set of performance factors, wherein each of the set of **performance factors defines an effect on a set of metrics for the engineering design of variations in a selected one of the set of design variables over a range of values** while holding the set of design variables except for the selected one at the baseline set of design values (emphasis added)

as recited in Claim 1. The Office Action indicates that Conn, at col. 5, line 13 through col. 6, line 22, teaches the "sensitivity analysis" recited in Claim 1. However, Conn merely describes a method in which "the gradients of the merit function

Φ are computed with respect to the design parameters." (Conn, col. 5, lines 62-63.) As is known in the art, a gradient refers to a derivative of a function at a point, and therefore does not teach "an effect ... over a range of values" as recited by Claim 1. For at least this reason, Claim 1 is allowable under 35 U.S.C. 102(b) over Conn.

In addition, Applicants further submit that Conn does not teach **"manually changing one or more of the baseline set of design values** based on the set of performance factors" (emphasis added) as recited by Claim 1. Conn is explicitly directed towards "methods for incorporation of noise consideration **during automatic circuit optimization.**" (Conn, col. 1, lines 15-16, emphasis added.) Conn describes a method in which "If the criteria are not met (block 16), based on the function and gradient values, **new design parameters are computed** (block 20) ... iterating until convergence." (Conn, col. 6, lines 17-22, emphasis added.) Nowhere does Conn disclose or suggest a method that involves "manually changing ... design values" as recited in Claim 1. For at least this additional reason, Claim 1 is further allowable under 35 U.S.C. 102(b) over Conn. Claims 2-4 and 6 depend from Claim 1, and are therefore allowable under 35 U.S.C. 102(b) over Conn for at least the reasons that Claim 1 is allowable. Accordingly, Applicants respectfully request reconsideration and allowance of Claims 1-4 and 6.

Claim 3, as amended, recites:

manually changing one or more of the revised set of design values based on the set of effects if the output set of values does not allow the engineering design to satisfy the performance criterion, and **if the set of performance factors is determined to remain accurate for the updated set of design values.** (Emphasis added.)

Support for this amendment is found in the specification as originally filed at least at paragraphs 24 and 43, and in FIG.

1. No new matter is added. "[M]anually changing one or more of the revised set of design values ... if the set of performance factors is determined to remain accurate for the updated set of design values" as recited in Claim 3 can beneficially allow "the designer [to] alter multiple design variables before having to perform another design variable sweep." (Specification, paragraph 24.)

For reasons similar to those noted above with respect to Claim 1, Conn does not teach "manually changing one or more of the revised set of design values" as recited by Claim 3. In addition, Conn does not disclose or suggest any consideration of whether "the set of performance factors is determined to remain accurate for the updated set of design values" as recited in Claim 3. Even assuming, arguendo, that the "gradients" and "design parameters" of Conn can be considered to correspond to the "performance factors" and "design values" of Claim 3, those gradients are recomputed (Conn, FIG. 1, block 12) each time the design parameters are changed (Conn, FIG. 1, block 20).

Thus, for at least these additional reasons, Claim 3 is further allowable under 35 U.S.C. 102(b) over Conn.

Claim 4, as amended, recites

applying a structural change to the engineering design to generate an updated engineering design if the output set of values does not allow the engineering design to satisfy the performance criterion, and if the set of performance factors is determined to not remain accurate for the updated set of design values; and

performing, on the updated engineering design, the steps of assigning the baseline set of design values, conducting the sensitivity analysis, manually changing one or more of the baseline set of design values, performing the simulation, and evaluating the output set of values. (Emphasis added.)

Support for this amendment is found in the specification as originally filed at least at paragraph 44 and in FIG. 2. No new matter is added.

Conn does not disclose or suggest "applying a structural change to the engineering design" as recited in Claim 4. Conn only describes a method in which "new design parameters are computed (block 20)" (Conn, col. 6, lines 18-19), wherein "[d]esign parameters are the values that are adjusted during optimization, e.g., transistor widths, wire sizes, resistance values and capacitance values." (Conn, col. 5, lines 15-18.)

Thus, for at least this additional reason, Claim 4 is further allowable under 35 U.S.C. 102(b) over Conn.

Claim 6, as amended, recites:

- wherein conducting the sensitivity analysis comprises:
 - selecting one or more of the design variables;
 - selecting a simulation range for each of the one or more design variables;
 - selecting a test one of the one or more design variables;
 - performing a set of simulations on the engineering design using the baseline set of design values and varying the test one of the one or more design variables over the simulation range for the test one to generate a test set of values for the set of metrics;
 - generating a set of test results for the test one of the one or more design variables by associating the test set of values with the simulation range for the test one of the one or more design variables;
 - repeating the steps of selecting the test one, performing the set of simulations, and generating the set of test results for each of the one or more design variables; and
 - compiling the set of test results for each of the one or more design variables into the set of performance factors.

Support for this amendment is found in the specification as originally filed at least at paragraphs 25, 28, and 43. No new matter is added.

As noted above with respect to Claim 1, Conn only teaches a method in which "the gradients of the merit function Φ are computed with respect to the design parameters." (Conn, col. 5, lines 62-63.) Since a gradient is a derivative at a point, Conn certainly does not disclose or suggest "performing a set of simulations ... varying the test one of the one or more design variables over the simulation range" as recited by Claim 6.

Thus, for at least this additional reason, Claim 6 is allowable under 35 U.S.C. 102(b) over Conn.

Claim 9, as amended, recites:

A system for interactively optimizing an engineering design, the system comprising:

- storage means for associating a baseline set of design values for a set of design variables for the engineering design;

- computing means for performing a sensitivity analysis on the engineering design to determine a set of performance factors, wherein each of the set of performance factors defines an effect on metrics for the engineering design of variations in a selected one of the set of design variables over a range of values while holding the set of design variables except for the selected one at the baseline set of design values;

- display means for visually displaying the set of performance factors; and

- means for allowing a user to select and change one or more of the baseline set of design values based on the set of performance factors.

Support for this amendment is found in the specification as originally filed at least at paragraphs 24, 28, 30, 35, 43, 47-56, and FIGS. 1 and 4-13. No new matter is added.

As noted above with respect to Claim 1, Conn does not teach "performing a sensitivity analysis ... to determine a set of performance factors ... [that] define[] an effect on metrics for the engineering design ... over a range of values [for design variables]" as recited in Claim 9. Therefore, Claim 9 is allowable under 35 U.S.C. 102(b) over Conn for substantially the

same reasons as described above with respect to Claim 1. Accordingly, Applicants respectfully request reconsideration and allowance of Claim 9.

Rejections Under 35 U.S.C. 103

Claim 5 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Conn in view of U.S. Patent No. 6,530,065, issued March 4, 2003 to McDonald et al. (hereinafter "McDonald"). Applicants respectfully traverse this rejection.

Claim 5, as amended, recites:

[W]herein conducting the sensitivity analysis comprises visually presenting the set of performance factors to a designer for review.

Support for this amendment is found in the specification as originally filed at least at paragraphs 29-30, 43, and FIGS. 4-13. No new matter is added. The "visual presentation" of Claim 5 beneficially "gives the designer an understanding of the important design variables, ... [allows] the information [to] be learned quickly [and allows] the designer's understanding of the topology's functioning [to be] improved." (Specification, paragraph 33.)

As noted above, Conn does not teach:

determin[ing] a set of performance factors, wherein each of the set of **performance factors defines an effect on a set of metrics** for the engineering design of variations in a selected one of the set of design variables **over a range of values** ... and

manually changing one or more of the baseline set of design values based on the set of performance factors.
(Emphasis added.)

McDonald teaches "system and corresponding method for providing designs and simulations" (McDonald, col. 4, lines 39-40), but does not remedy the deficiencies of Conn. Therefore, for at least this reason, Claim 5, which depends from Claim 1, is

allowable under 35 U.S.C. 103(a) over Conn in view of McDonald. Accordingly, Applicants respectfully request reconsideration and allowance of Claim 5.

New Claims

New Claim 10 recites "further comprising means for allowing the user to apply a structural change to the engineering design." Support for Claim 10 is found in the specification as originally filed at least at paragraph 44 and in FIG. 2. No new matter is added.

Claim 10 depends from Claim 9, and is therefore allowable over Conn and Conn in view of McDonald for at least the same reasons that Claim 9 is allowable. Furthermore, neither Conn nor McDonald teaches "apply[ing] a structural change to the engineering design" as recited by Claim 10. Thus, for at least these reasons, Applicants respectfully request consideration and allowance of Claim 10.

New Claim 11 recites:

A software tool for controlling a computing system,
the software tool comprising:

- instructions for causing the computing system to store a baseline set of design values for a set of design variables for an engineering design;

- instructions for causing the computing system to perform a sensitivity analysis on the engineering design to determine a set of performance factors, wherein each of the set of performance factors defines an effect on a set of metrics for the engineering design of variations in a selected one of the set of design variables over a range of values while holding the set of design variables except for the selected one at the baseline set of design values;

- instructions for causing the computing system to graphically display the set of performance factors for a user; and

- instructions for causing the computing system to adjust one or more of the baseline set of design values to generate an updated set of design values for

the set of design variables in response to an input from the user.

Support for Claim 11 is found in the specification as originally filed at least at paragraphs 24, 28, 30, 35, 43, 47-56, and FIGS. 1 and 4-13. No new matter is added.

Claim 11 is allowable over Conn and Conn in view of McDonald for at least the same reasons presented above with respect to Claim 9. Accordingly, Applicants respectfully request consideration and allowance of Claim 11.

New Claim 12 recites:

[F]urther comprising instructions for causing the computing system to perform a simulation of the engineering design using the updated set of design values to determine an output set of values for the set of metrics.

Support for Claim 12 is found in the specification as originally filed at least at paragraph 43 and in FIG. 1. No new matter is added. Claim 12 depends from Claim 11, and is therefore allowable for at least the same reasons that Claim 11 is allowable. Accordingly, Applicants respectfully request consideration and allowance of Claim 12.

New Claim 13 recites "further comprising instructions for applying a structural change to the engineering design." Support for Claim 13 is found in the specification as originally filed at least at paragraph 44 and in FIG. 2. No new matter is added. Claim 13 depends from Claim 11, and is therefore allowable for at least the same reasons that Claim 11 is allowable. In addition, neither Conn nor McDonald teaches "applying a structural change to the engineering design" as recited by Claim 13. Accordingly, Applicants respectfully request consideration and allowance of Claim 13.

New Claim 14 recites

wherein the instructions for causing the computing system to perform the sensitivity analysis comprise:

selection instructions for causing the computing system to select a test one from a set of one or more of the design variables;

simulation instructions for causing the computing system to perform a set of simulations on the engineering design using the baseline set of design values and varying the test one of the one or more design variables over a simulation range for the test one to generate a test set of values for the set of metrics;

result generation instructions for causing the computing system to generate a set of test results for the test one of the one or more design variables by associating the test set of values with the simulation range for the test one of the one or more design variables;

looping instructions for causing the computing system to repeatedly execute the selection instructions, the simulation instructions, and the result generation instructions to generate the set of test results for each of the set of one or more of the design variables; and

compilation instructions for causing the computing system to compile the set of test results for each of the set of one or more of the design variables into the set of performance factors.

Support for Claim 14 is found in the specification as originally filed at least at paragraphs 28, 29, 34, 43, and 50-55, and in FIGS. 4-13. No new matter is added. Claim 14 depends from Claim 11, and is therefore allowable for at least the same reasons that Claim 11 is allowable. In addition, as described above with respect to Claim 6, Conn only teaches a method in which "the gradients of the merit function Φ are computed with respect to the design parameters" (Conn, col. 5, lines 62-63) and therefore does not disclose or suggest "perform[ing] a set of simulations ... varying the test one of the one or more design variables over a simulation range" as recited by Claim 14. McDonald does not remedy this deficiency of Conn. Accordingly, Applicants respectfully request consideration and allowance of Claim 14.

CONCLUSION

Claims 1-6 and 9-14 are pending in the present Application. Reconsideration and allowance of these claims is respectfully requested.

If there are any questions, please telephone the undersigned at (408) 451-5903 to expedite prosecution of this case.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as FIRST CLASS MAIL in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 19, 2005.

5/19/2005
Date

Rebecca A. Baumann
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